however, that, as a rule, the dyes most effective are fluorescent, and capable of combining with silver, which may be a help in estimating the reason of the alteration. After referring to other researches of Chastaing and Berthelot, the author glances at the method of estimating the intensity of the chemical rays by the combination between chlorine and hydrogen. The feasibility of this plan was announced by Draper, in 1843, but it was only carried into practical effect by Bunsen and Roscoe, who published their first results in 1853. In 1857 Draper proposed an actinometer based on the decomposition by light of ferric oxalate into ferrous oxalate and carbonic anhydride. "Unfortunately," says the author, "Draper's process, if it leaves nothing to be desired in regard to precision and sensitiveness, is laborious in execution, and is hardly possible in practice."

A reference is also made to the use of a mixture of oxalic acid and uranium nitrate by Nièpce de St. Victor for the same purpose, with a statement that with the actinometer employed the readings were very precarious, though by improved apparatus they might be made more reliable.

Bunsen and Roscoe's actinometer, which, as before stated, depended on the combination between chlorine and hydrogen, is next fully discussed. The various experiments made to obtain a proper unit of intensity, to ascertain the absorption of rays due to the chemical operations performed by the light, and the relative effect of the different portions of the spectrum, are well worthy the attention of all workers in this branch of research.

In the next division of the book we have a *résumé* of the work done by, and the apparatus necessary for, an actinometer dependent on the darkening of silver chloride, the latest form of which was brought out by Roscoe in 1874, and is known as his automatic actinometer.

The substance of the various papers on the subject by Bunsen and Roscoe which have appeared in the *Philosophical Transactions* at different times have been condensed in a division entitled the "applications climatologiques," and very interesting it is. Thus we have an account of the measurement of the intensity of light proceeding from various parts of the sky with the sun at different altitudes; of a measurement of the intensity of direct sunlight; the effect of the height of the barometer and thermometer on the amount of chemical radiations; and of the variation of their intensity at different times of the year and at different latitudes.

In another division we have a discussion on the actinometer of Roussin dependent on the chemical reaction of nitro-prussiate of sodium and ferric chloride; of Phipson's proposal to employ molybdic acid dissolved in an excess of sulphuric acid; of Becquerel's ammonium oxalate with mercuric chloride actinometer, and also of his electro-chemical measurer; and finally we have a description of Marchand's researches, which at present have been but little known in England. We suppose it was impossible to close the subject without an article dedicated to "Light and Vegetation," which perhaps is long enough considering how little is really known of these relations.

We have been thus specific in giving the contents of Radau's little work, as it is in reality the only readily accessible account of the classical researches of Bunsen and Roscoe. The years which have been occupied in these investigations by these physicists number more than twenty, and it is doubtful if the results obtained have received all that attention from men of science which they deserve. No one who has not been engaged in similar experiments can be aware of the difficulties to be encountered in carrying them out; that they are great may be shown by the fact that no independent attempt has been made to check the results or at all events there are no published accounts of them.

The book is a compilation of the results obtained by various persons, and it would be out of place to criticise it in the same way we should if it contained original investigations made by the author. At the same time we may say that there are some few points in the various researches which are open to modification and even to correction, more particularly in those of Marchand.

BRAIN

Brain; a Journal of Neurology. April 1878. Part I. To be published quarterly. (London: Macmillan and Co.)

A NEW scientific quarterly has made its *début*, entitled *Brain*, a Journal of Neurology, edited by Dr. Bucknill, Crichton-Browne, Ferrier, and Hughlings-Jackson, names well known in connection with the physiology and pathology of the nervous system, and supported by an able staff of contributors.

According to the prospectus which has been issued, *Brain* will treat of the anatomy, physiology, pathology, and therapeutics of the nervous system, from the brain, downwards. The functions and diseases of the nervous system will be discussed, both in their physiological and psychological aspects, but mental phenomena will be treated only in correlation with their anatomical substrata, and mental disease will be investigated as far as possible by the methods applicable to nervous diseases in general. The want of such a journal has, say the editors, been long felt; and, considering the great advances which have been made of late years in the physiology of the brain and nervous system, and the great ignorance that prevails with respect to diseases of the nervous system, even among the majority of otherwise well-informed medical men, we believe the statement well founded, and anticipate a career of great usefulness to the newly-founded journal. In the first number the editors have fulfilled the greater part of their programme, which is stated to include original articles, critical digests, reviews, and abstracts of researches on the nervous system at home and abroad, correspondence on matters relating to neurology, &c. The strength of Part I. lies in its original articles. The first is by Mr. Jonathan Hutchinson, "On the Symptom-Significance of Different States of the Pupil;" the second by Mr. G. H. Lewes on "Motor-Feelings and the Muscular Sense;" the third by a French contributor, M. Duret, "On the *Rôle* of the Dura Mater and its Nerves in Cerebral Traumatism;" the fourth by Dr. Gowers, "On some Symptoms of Organic Brain Disease;" the fifth "On Brain Forcing," by Dr. Clifford Allbutt; the sixth by Dr. Bevan Lewis "On the Comparative Structure of the Cortex Cerebri;" and the seventh by Mr. Crochley Clapham, "On Skull Mapping." There are also clinical

cases by Drs. Hughes Bennett, Buzzard, and Urquhart. Dr. Ferrier gives an analysis of an important memoir by Dr. Duret, "On the Mechanism of Cerebral Concussion and Compression," and Dr. Bucknill reviews severely, but not beyond its deserts, a work by Dr. Bateman, intitled "Darwinism Tested by Language," in which the main point sought to be established against Darwin and evolution is the immateriality of the faculty of speech, and its being a distinctive attribute of man.

Several shorter notices are given of recent papers and lectures relating to the brain and nervous system. These might, with advantage, have been much more numerous, and we hope to see this part of the programme more completely carried out in subsequent numbers.

The original articles would require each a separate analysis to do them justice. We content ourselves in the meantime with merely mentioning their titles. They are all worthy of attentive study, and many of a high standard of excellence, as might indeed be expected from the names of the contributors.

While the majority of the articles in *Brain* are of special interest to physiologists and medical men, they will, at the same time, prove a rich field of material for those—a rapidly increasing army—who believe that psychology is to be advanced, not merely by interrogating consciousness, but by intelligent study of the relations between body and mind, as indicated by physiological research and the phenomena of disease.

While philosophical speculation has interest but for very few of the medical profession, the facts relating to diseases of the nervous system daily observed by medical men, and reported and commented on in a journal like *Brain*, ought to prove of value to all students of the problems of physio-psychology.

We heartily wish *Brain* all success and prosperity in its career.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

The New "Oil Immersion" Object-Glass Constructed by Carl Zeiss, of Jena

By the courtesy of its manufacturer, this remarkable lens was sent me, a fortnight since, that I might carefully examine it. The results may be of interest to those who have not seen the lens: and the statement of them is due to the industry and skill of the maker.

The lens has a focal length of one-eighth of an inch: it is an "immersion," but the fluid employed is the oil of cedar wood. The object of this is that the fluid placed between the lens and the covering glass of the object, may have refractive and dispersive indices as nearly as possible coincident with those of crown glass, the material of which the covers and the front lens are composed. Ol. ligni cedri is the liquid that has been found to be most capable of meeting these conditions; and by its use the covering glass, thick or thin, and the oil and lens, become practically one homogeneous whole; and the need for the "screw collar correction" for different thicknesses of cover, is done away. At the same time, and by the same means, a large and efficient "angle of aperture" is secured. Mr. J. W. Stephenson, F.R.M.S., suggested to Prof. Abbe this method, and Prof. Abbe and Carl Zeiss have together produced the glass.

As a piece of workmanship it is extremely fine; and it can be used with quite as much ease as an ordinary immersion $\frac{1}{4}$-inch objective. It works admirably with Powell and Lealand's ordinary sub-stage condenser, with Wenham's reflex illuminator, and with the small plano-convex lens which the maker sends with it to be fastened to the under surface of the slide with the oil of cedar wood. But I have also secured admirable results with the illuminating lens of Powell and Lealand's supplementary stage, which gives entire command over the angle of the illuminating ray.

The "spherical aberration" in this lens is beautifully corrected; the "field" being perfectly flat. The colour corrections are, so far as the lens goes, equally perfect; but are somewhat conditioned by the dispersive power of the oil, which can be modified readily, and for which Carl Zeiss provides. The sharpness and brilliance of the "definition" which this lens yields is absolutely unsurpassed, in my experience; and it has a very great power of "penetration."

I tested it with a series of "tests" with which I have proved and compared the glasses of various makers in England, the Continent, and America for some years. Up to the time of receiving this lens, the $\frac{1}{8}$-inch that had done the most in my hands, was one of the "new formula" lenses of Powell and Lealand. It is but justice to say that all my most crucial tests were equally mastered by the lens of Carl Zeiss. I have not been able to do more with it, than with the English glass, *but the same results* can be accomplished *much more readily*. The correction has to be brought into operation, and careful adjustment made, to get the finest result with the English lens; but the German glass has simply to be brought into focus, and the best result is before the observer, provided that the light has been adjusted in the most efficient manner. It is true that for sharp and perfect definition we must be careful to adjust the length of the draw-tube; in working this lens there is much need of attention to this matter; and speaking from a practical point of view, it takes the place, in securing crisp definition, of the screw-collar adjustment; although, of course, much easier of application. But it is so easy to work the lens with fine results on the more delicate tests, that I think that those who make the resolution of these their primary object in the possession of a microscope, can scarcely fail in securing their utmost desire. It is a glass pre-eminently suited for the resolution of difficult lined or beaded objects.

I have in my cabinet several frustules of *Navicula rhomboides* ("*N. crasinnervis*") which I cannot fully resolve with Powell and Lealand's new formula $\frac{1}{16}$-inch objective. But all that I *can* resolve with the English $\frac{1}{8}$ I have resolved with the German glass. *Amphipleura pellucida* is easily resolved into delicate beads when the frustules are moderately coarse; and almost any that can be met with are resolvable into lines; and this when these diatoms are mounted in balsam. And the highest eye-pieces made may be used without any practical detriment to the image; although, of course, with a reduced sharpness of the definition.

On the whole, I think it in many senses the finest lens, of its power, that I have ever seen; and in every sense it is an admirable acquisition.

But it is a fact that even water "immersion" lenses are of very limited service in observations continuously conducted upon minute *living* organisms in fluid. We may gladly call in their aid, in the determination of a delicate change of form, or in the more perfect detection and definition, of an obscure point of structure; but for steady and constant work we are bound to avoid them; for the fluid under the delicate cover is in danger every moment of being "flooded" by coming into contact with the water on the top of the cover, and, between it and the lens; because the movements of the organism have to be counteracted by the movements of the mechanical stage, in order to keep any form that may be studied in view constantly. But this opens to us the possibility of going to the edge of the cover at any moment; and thus, by the mingling of the fluids, rendering the observation void. This, of course, will apply still more fully when, as in the case of the valuable glass of Zeiss, the "immersion fluid" is an essential oil.

Happily it is only in special cases that the greater analysing power, combined with larger working distance, which is possessed by immersion lenses, is required. It is in the earlier study of an organism, and before continuous work upon it has begun. And even if it be not, in the majority of cases, a first-class dry English lens of a higher magnifying power, if efficiently